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Editorial

Nominating Fellows

For the past 20 years, AGU has elected a few Members each year to the grade of Fellow in recognition of their outstanding contributions to the various branches of geophysics. The bylaws of AGU stipulate that only Members of AGU may be elected Fellows and that the number elected in a given year shall not exceed 0.1% of the then current membership of AGU. At present there are 379 Fellows.

For many years nominations for Fellowship have been requested from the membership at large. To encourage more active participation on the part of all sections of AGU as well as by those unaffiliated with any section, the Council (May 24, 1981) adopted the following procedure.

1. Nominations are to be sent to the Fellows Committee through the respective section presidents or through their designated committee.

2. Nominations of individuals unaffiliated with any section may be sent directly to the Fellows Committee.

3. Each section may submit at most three nominations to the Fellows Committee.

It is intended that the sections serve both as initial reviewer of the nominations and as an advocate for their selections. The Fellows Committee will maintain a list of past nominations but not of their supporting statements. Thus any previous nominations must be resubmitted as a new nomination.

By this procedure it is hoped that there will be a better sectional balance of nominations.

It appears that some sections have been much more active than others over the past 10 years in nominating and promoting the selection of their candidates. The fact that the Planetology and Solar-Planetary Relationships sections have large numbers of Fellows elected in recent years, when compared with the percentage of the total membership affiliation in those sections, may also reflect the pace of research in these areas. The number of Fellows elected during 1971–1981 is shown in Table 1 as is the percentage for primary section affiliation for the total membership. Between 1962 and 1971 it was AGU's practice to select automatically as AGU Fellows those members who were elected Fellows of the National Academy of Sciences and the National Academy of Engineering. An imbalance from the large initial selection of Fellows in 1962 resulted. One hundred twelve of these Fellows are still current members and comprise 30% of the current Fellows. Although considerable improvement in the balance among sections has been achieved since that time, the problem has by no means been completely rectified. The fourth column shows the percentage of Fellows by section for those that became Fellows before 1983 and are still members.

TABLE 1. Fellows as a Percentage of Affiliation

Section	Membership Affiliation By Section, percent	Fellows By Section, percent	Fellows Elected 1971–1981, percent	Fellows Selected in 1962, percent
Geodesy	4	5	8	1
Geomagnetism and Paleomagnetism	5	6	8	5
Hydrology	17	8	8	8
Meteorology	8	11	8	18
Oceanography	13	8	11	5
Planetology	5	8	8	8
Seismology	10	11	8	10
Solar-Planetary Relationships	12	17	20	16
Tectonophysics	9	10	11	8
Volcanology, Geochemistry, and Petrology	10	12	8	18
None	7	2	3	4

Fellows' nominations must be made on forms available from AGU, 2000 Florida Avenue, N.W., Washington, D.C. 20009 (telephone: 202-462-6903 or toll free 800-424-2488).

The time schedule for the 1982 election of Fellows is as follows: October 1981, call for nominations now appearing in *Eos;* November 15, 1981, deadline for nominations to section presidents; January 15, 1982, deadline for nominations to Fellows Committee; April 15, 1982, deadline for citations; June 1, 1982 (tentative), honors ceremony in Philadelphia.

Nicholas C. Metales
Chairman, Fellows Committee

EOS
TRANSACTIONS, AMERICAN GEOPHYSICAL UNION

The Weekly Newspaper of Geophysics

Send double-spaced manuscripts (four copies) to *Eos*, AGU, 2000 Florida Avenue, N.W., Washington, D.C. 20009, or send them directly to one of the associate editors with a copy to the above address.

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Cover. Field lines in the Jovian magnetosphere (heavy lines) and contours of constant B magnitude (light lines) based on a model of Jupiter's azimuthal current disc. Currents flow in an equatorial annulus of width 5 R_J, extending from 5 R_J (near the orbit of Io) to 50 R_J, approximately 100 million amperes in all. (Figure from J.E.P. Connerney, based on a model from his article in the special Voyager issue, *J. Geophys. Res., 86* (A10), 1981.)

Correction

Voyager advertisement, EOS 9/29/81, page 682 should read 'Voyager Missions to Jupiter.' See corrected ad this issue page 698.

News

Space Telescope Leads a New Generation

The Space Telescope, approved for a space shuttle launch in 1985, will resolve visible and ultraviolet light orders of magnitude better than earth-based telescopes. Even though its aperture of 2.4 m will be less than half of the aperture of the reflector at Mt. Palomar, it is considered relatively large and immensely superior to existing orbiting telescopes. It is expected that the Space Telescope, with its freedom from thermal jitter and the hindrance of atmospheric absorption, will increase the user load on larger aperture earth-based telescopes, and construction of a new series of large telescopes is now in the planning stages. The National Academy of Sciences is expected to release shortly a report by its Astronomy Survey Committee, headed by George Field of the Harvard-Smithsonian Observatory, that will recommend building a 15-m optical-infrared 'National Telescope' [*Phys. Today*, August 1981, p. 17]. In addition, a 7.6-m single reflector is planned at the University of Texas, a 10-m segmented reflector is planned at the University of California, and the University of Arizona is experimenting with designs of a Multiple-Mirror Telescope (MMT) larger than their new 4.5 m (equivalent) MMT. All of these are larger than the Russian 6-m telescope, whose Pyrex reflector has not performed well, apparently because of gravitational sag and thermal inertial stresses.

Discussions of the planned Space Telescope [i.e., J. Bancall and C. O. Dell, The Space Telescope observatory, *J. Astron. Sci., 28*, 107, 1980] are mostly technical, the main objectives being new (unidentified) discoveries in space. Not only will the telescope be equipped with an array of high resolution and 'faint-object' spectrographs, photometer, and cameras, but instruments will be installed in space by astronaut-operators to accommodate new projects and for updating purposes. Every 5 years the observatory will be returned to earth for a refit.

The orbiting telescope will not make the earth-bound telescopes obsolete but will act as a forerunner for new discoveries in space. The high angle resolution range will be explored, and the accuracy of the spacecraft's fine guidance system will contribute greatly to the observations. It is pointed out that the smaller collecting area of the Space Telescope reflector is significantly slower than larger aperture earth telescopes (except for faint objects). Harlan Smith, chairman of the Associated Universities for Research in Astronomy, has said that because the operational Space Telescope costs are a factor of 10 higher than earth-based telescopes, 'each photon in space will cost a hundred times more than those gathered on the ground' [*Phys. Today*, August 1981, p. 17].

The proposed new telescopes will depend on new technology to overcome problems arising from the large stresses on the high precision reflecting mirrors. Surfaces must not deform by more than 10^{-1} μm over the 7- to 10-m diameter. New mounting techniques, new materials, and new weight-saving techniques will be used to conserve rigidity of the reflectors by avoiding some of the more objectionable sources of gravitational stress concentrations. Computers will be used for complex requirements of tracking and for matching alignment of multiple mirror systems. Special glasses and other materials will be employed to overcome thermal stresses. New lens grinding procedures using interferometric laser beams are more accurate than before, and it may be possible to obtain *f* stop configurations of an order of magnitude lower than those possible by previous methods. Fourth-order parabolic surfaces are difficult to grind, and several new techniques will be attempted.

Operation techniques of the new telescopes will be devised to take advantage of the gravitationally stable, low thermal-inertia surfaces. The multiple-mirror telescopes may use an oscillation technique to cancel the atmospheric jitter caused by clear-air turbulence. Images defined accurately by the space telescope may provide reference calibration for observations on the ground, and thus they can be used as continual references during a given observation.

The new era of telescopes will begin with the launching of the Space Telescope in 1985. The larger ground-based telescopes will probably not be in operation before 1990. The applications and goals, in addition to improving present observations, include obtaining new values for astronomic distances, searching for new planets outside of our solar system, observing giant and supergiant stars, making new spectral measurements of quasars, studying interstellar matter, and measuring stellar brightness.—*PMB*

New JGR-Blue Editor

As of October 1, 1981, all new manuscripts for the *Journal of Geophysical Research*, Blue, are to be sent to Bengt U. Ö. Sonnerup, Thayer School of Engineering, Dartmouth College, Hanover, NH 03755.

Ariane: NASA's European Rival

The successful test launch of two three-quarter ton satellites in the European Space Agency's (ESA) Ariane rocket last June firmly placed ESA in competition with NASA for the lucrative and growing satellite launching market. Under the auspices of the private (but largely French-government financed) Arianespace company, ESA is already attracting customers to its three-stage rocket by offering low costs.

According to recent reports [*Nature*, *292*, pp. 785 and 788, 1981], Arianespace has been able to win several U.S. customers away from NASA, including Southern Pacific Communications, Western Union, RCA, Satellite Television Corporation, and GTE. *Nature* [*292*, 1981] magazine in an article entitled 'More Trouble for the Hapless Shuttle' suggests that it will be possible for Ariane to charge lower prices for a launch than NASA, even with the space shuttle.

It is noted that the shuttle is far behind schedule, and its near-future flights may be subjected to great demand for military projects. The costs of placing a three-quarter-ton satellite into geostationary orbit are about $28 million by ESA with Ariane and about $35 million by NASA with the Thor Delta rocket system. The analogous costs of the

spece ehuttle are about hall Delte's coete per eatellite, but the ehuttle's coste ere rieing.

Another teet ot the three-stege Arlene is due in Novemher. It succeesiul, ESA plens to run five flights per yeer, gredueting to 10 or more per yeer. Expended launch tecilities in French Guiana will be constructed to hendle the increesed peyloede ot edvenced vereions ot the Arlene rocket. The present rocket is cepeble of hendling e combined totel peyload ot 17000 kg. New vereions ot the rocket will heve increesed thruet end booster rockets. The peyload will be increesed first by about 15%; e third version will cerry about 2500 kg.

The setellite business is complex. Telecommunicetions end ceble television setellites ere the most lucretive. Factors in the coste introducsd by scientific end military peyloeds ere difficult to essess. A pert of the cost derives from reliebility end beckup systems. (During the second, unsuccesetul flight of Arlene in 1980 two German eatellites were lost, e scientific probe nemed Flrewheel end the Oscer 9 emateur-redio rolay.) The Arlenespace Compeny is owned end tinenced by Europeen aerosepce corporetions, verious European benks, and the French spece egency. With government pertlcipetion in the launching business, the cherges for placing e setellite into orbit may not reflect the true costs.

The impact ot Arlene on U.S. spece elcience may be in the torm ot support ot NASA's programs. In the offing ere joint projects with ESA, such es the International Solar Polar Mission (ISPM), whose budget is now being conaidered by the White House and Congress. ⊠

Marginal Ice Zone Processes

As a follow up to a spocial eession on merginal ice zone (MIZ) processes (*Eos, 62*, September 1, p. 852), e collection of papers on MIZ is being planned for the *Journal of Geophysical Research*. Deadline lor submission of menuecripts tor the epecial collection is April 1, 1982.

Menuscripts should be sent to the coeditor of JGR, Oceens end Atmosphores, A. D. Kirwen, Jr., Depertment of Merine Science, University of Soulh Florlde, 140 Seventh Ave. South, St. Petersburg, FL 33701. Authors are requested to epecify thet menuecripts are tor the speciel MIZ issue.

Additional information on the MIZ issue ot JGR end on the epecial Fell Meeting eession can be obteined from Robin D. Muench, Coordinator, JGR/MIZ Issue, SAI, Norih-west, 13400B Northrup Wey #36, Bellevue, WA 98005 (telephone: 206-747-7152). ⊠

Geothermal Drilling

A geothermel teel hole drilled into the summit crater of Newberry Volcano in Oregon measured 190°C et 810 m. This le the hottest temperelure measured and reported so ter in Oregon, not lor ell geothermel teet holes in the United Stetes, as reported in the September 15 issue ot *Eos*.

Edward Semmel, e U.S. Geological Survey hydrologist, is the leader of the geothermel drilling project et Newberry. David Bleckwell of Southern Methodist Univerelty wes incorrectly reported to be the project leeder; he mede the temperelure meeeurements in the hole. Additionel drilling has penetrated deeper end to higher temperelures. ⊠

Candidates for JGR-Red Editor Sought

Thomas J. Ahrens will complete his term as editor of the *Journal of Geophysical Research*—Red at the end of 1982. A selection committee has been appointed to recommend candidates to the AGU president. Nominations for the editor lor the red section of JGR lor the term 1983–1986 are now being accepted. Those who are interested in serving as editor, or who wish to suggest candidates, should send recommendations by February 15, 1982, directly to

American Geophysical Union
2000 Florida Avenue, NW.
Washington, D.C. 20009
Attention: JGR Search Committee

Geophysicists

Allen W. Hathewey, professor of geological engineering et the University of Missouri in Rolle, hes been selected by the Geological Society of America as the 1981 recipient of the E. B. Burwell, Jr., Memorial Award for Outstanding Contributions to Engineering Geology. The award will be presented at the GSA annuel meeting in November.

Elizebeth Rona, died on July 27, 1981. She joined AGU in 1967.

H. W. Straley, III, e Life Member, died on October 12, 1979. He joined AGU in 1932.

New Publications

Geophysical Aspects of the Energy Problem

A. Repolle, G. V. Keller, and D. J. Moore (Eds.), Elsevier, New York, xiv + 325 pp., 1980, $67.75.

Reviewed by Herbert F. Wang

Geophysical Aspects of the Energy Problem is e collection of papers resulting from e short course ot thet title held et the School of Geophysics ot the 'Ettore Majorane' International Centre for Scientific Culture, Erice, Italy, during June 1978. Many papers heve e Europeen flevor in the choice ot exemples end literature citetione. One encountere monetary unite from rubles to dollers.

The primary emphesis is on geothermal energy with e potpourri ot other topics renging from geochemistry of uranium to elmospheric dispersion ot contaminents from power plent etacks. The only wey to give en idee of the contents is to go to e chapter by chepter description. However, I must wern potential readers of the shoddy eppearance of a book listed et $67.75. The book looks like class hsndouts. It contains numerous typographic errors, uneven spacing, and mislabeled graphs. It lacks running heads. I could give the editors several pages of arrale.

The first six chepters, which make up two-thirds ot the book, ere devoted to geothermal energy. The first chapter by J. Goguel is entitled 'Thermodynamic Aspects of Geothermel Energy.' The peper opens somewhet grandiosely: 'Since Promeitheus, man has striven to divert lor his use pert of the nalurel flowa ol energy. To meke any further advance we must understand and enelysa (sic) ell aspects ol the netural flow end budget ol energy for our Earth, or better, for the universe as a whole.' The first helf of the chepter surveys the energetics ot solid eerth processes. Since no relerences are given for the materiel in the chapter, checking stetements and numerical velues le difficult. For exemple, what can be made ot e sentence, 'We must not forget that the average velue of gravity diferantiation energy in the formation of the cors, (sic) is 18 × 10 kW.' The second helf of the chapter dealing with manifestations of geothermal energy is much better. The section on phreatic explosions presages Mount St. Helene by indicating that en explosion can be triggered by e rock slide at the surface.

The second chapter by G. V. Keller on 'Geophysical Methods in Prospecting lor Geothermal Resources' is one of tha best in the book. The chapter consists of a balanced review ol geophysical methods, especially electrical methods, and case histories. A definition of 'bipole' as a 'long dipole' would have been useful. Given the typewritten production of the book, it seems as if 1978 relerences in preas could have been updated by Keller.

The third chapter by F. Mongelli is entitled 'Geothermel Prospecting lor Geothermal Fields,' but in actuality it is a discussion ol thermal conductivity measurements and their use in estabiishing thermal profiles.

The next three chapters are oriented toward specific geothermal systems. J. Varet classifies low enthalpy geothermal fields in Frence, A. C. Gringarten discusses a mathematical model of heat extraction in a hot dry rock system, and Y. D. Diedkin describes similar modeling efforts in the Soviet Union. His chepter also includes en interesting discussion of an economic mathematical model, which reflects the economic principles end prices as adopted in the USSR. The chapters by Diadkin end Gringerten point out some of the lack of editing in this book. Diadkin in his equation 26 quotes equation 27 in Gringerten's chapter, but with different notation end a typographical error.

The nongeothermal chepters of the book open with a discussion of 'Physical end Geophysical Aspects ot Solar Energy' by V. Silvestrini. This chapter describes spectral properties of solar radiation, selective covers for both solar heating and cooling, and the use of climate data for architectural design. A philosophy akin to Ian McHarg's *Design with Nature* appeare here and there in the chapter. 'We do not elm for solutions which imply that technology is incompatible with nature; the general attitude must be reversed, and starting from a study of the environmental conditions we have to adapt technology to the environment." Because Farrington Daniels' *Direct Use of the Sun's Energy* is one of my favorite books covering some of the same ground as this chapter, I was disappointed that it was not given in the references.

The next chapter by P. Gasparini and M. S. M. Mantovani on 'Geochemistry and Geology of Uranium Deposits' was concise and readable, but one wonders why it was in a book on 'geophysical aspects.'

A. Castellani discusses 'Earthquakes and Security of Nuclear Plants.' The discussion is devoted mainly to comparison of the 'safe shut-down earthquake' versus the 'operating base earthquake,' in this subject, as in others discussed in this book, differences occur between European and U.S. approaches.

The final chapter by D. J. Moore is on 'Atmospheric and Water Pollution from Power Plants.' An extremely broad subject is covered, and necessarily much is skimmed lightly. A general idea is conveyed about the role of atmospheric layering and dispersion on the transport of flue gases from conventional power plants. Plant cooling by discharge into estuaries or cooling ponds is also discussed.

Despite the several shortcomings of the book, I learned some things in areas with which I am not familiar. Others may find it informative to browse through the book in the spirit of inspecting an enthology. But I cannot recommend its purchase.

Herbert F. Wang is with the Department of Geology and Geophysics, University of Wisconsin, Madison, Wisconsin.

Classified

EOS offers classified space for Positions Available, Positions Wanted, and Services, Supplies, Courses, and Announcements. There are no discounts or commissions on classified ads. Any type that is not publisher's choice is charged for at display rates. EOS is published weekly on Tuesday. Ads must be received in writing on Monday 1 week prior to the date of the issue required.

Replies to ads with box numbers should be addressed to: Box ____, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, D.C. 20009.

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For special rates, query Robin Little, 800-424-2488.

POSITIONS AVAILABLE

Research Position in Chemical Oceanography. California Institute of Technology, Division of Geological and Planetary Sciences. The position of research fellow is being offered at Caltech for research in oceanography. Investigation of the isotopic composition of neodymium and rare earth abundances in sea water and sediments is now being carried forward. The mechanism of injection of REE into sea water will be studied. The differences in $^{143}Nd/^{144}Nd$ in various water masses [Piepgras et al, Earth and Planet Sci. Lett. 45, 223–239 and Piepgras and Wasserburg, Earth and Planet. Sci. Lett 50, 128–138 (1980)] is now being carried forward as an exploratory venture in order to determine the origin and chemical behavior of REE in the ocean and the potential use of $^{143}Nd/^{144}Nd$ as a tracer. The laboratory facilities for sample preparation and analysis are fully functional and will be available. Applicants should have training in oceanography and a good perspective on general physical oceanographic models.

Send resume and references to Professor G. J. Wasserburg, Lunatic Asylum, California Institute of Technology, Pasadena, CA 91125.

Caltech is an equal opportunity/affirmative action employer (M/F/H).

Position in Reflection Seismology/Rice University, Houston, Texas. The Department of Geology plans to expand its geophysical program. Emphasis will be on reflection seismology. At this time applications are for the first of two open faculty positions. The successful applicant will help in the search for and selection of the second faculty member.

Your main responsibility will be to lead our department into the area of modern reflection seismology. Your main teaching and research interests should be in the acquisition and processing of reflection seismic data. You should also help in developing rigorous undergraduate and graduate courses, which are supported by the traditional strength of the Math Sciences, Physics, and Electrical Engineering Departments at Rice. Enthusiasm to work with and undertake some joint projects with our geologists is essential.

Our plans are to acquire a computer system configured for high quality data processing. Substantial seed money for this facility is already in hand. Creative cooperation with the oil and geophysical industry in Houston, including a reasonable amount of consulting, is encouraged. Salary will be commensurate with qualifications and experience.

Please send your curriculum vitae, a summary of experience in seismic processing, a statement of research interests, and names of three or more references to Dr. A. W. Bally, Chairman, Department of Geology, Rice University, P.O. Box 1892, Houston, Texas 77001. Application deadline—December 1, 1981.

Rice is an equal opportunity employer.

Field Research Positions. The Exploration Research Laboratory of the Colorado School of Mines may have openings for a field party manager and/or an assistant field party manager on or about January 1, 1982. Position level will be negotiated based on qualification. This position involves, principally, seismic data acquisition but the person may participate in a wide range of field activities including resistivity, gravity and magnetics, etc. This is an opportunity to participate with a large geophysics research and development group. Specific responsibilities include planning and coordination of field work, training of crew members, and supervision of pre-processing. The position is most challenging and offers wide scope for initiation and acceptance of responsibility. Interaction with industry professionals, ERL staff, and faculty members of the Department of Geophysics is required. If is a position for growth, and challenge. A bachelors or masters degree is required for each of the positions. Field crew experience would be helpful. Ability to direct subordinates, interface with diverse groups, and communicate results is essential. Extensive field travels required for the Assistant Field Manager. Significant field time is required for the Manager. Scheduled are not firm and are subject to research commitments and research time frames. Typical academic environment fringe benefits are available. If interested in further details or in submitting an application, contact Dr. James C. Applegate, Director, Exploration Research Laboratory, Colorado School of Mines, Golden, Colorado 80401.

The Colorado School of Mines is an affirmative action/equal opportunity employer.

Physical/Coastal Oceanographer. The Center for Coastal Studies, Scripps Institution of Oceanography, has an opening for a physical, coastal oceanographer to conduct research in an ongoing program of innovative sediment management technology with emphasis on sediment responses to the forcing functions of waves, winds and currents. The incumbent will select and publish on research projects into fundamental physics of coastal and harbor sedimentation and advance alternatives to current coastal engineering practices.

Appointments are for 1 or 2 years (renewable) at the postgraduate research or assistant research level. Qualifications for postgraduate research level are PhD or equivalent in physical oceanography/coastal processes and/or applied physics/mechanics with emphasis on granular/fluid mechanics. Appointment at the assistant research level requires the above qualifications and a demonstrated publication record. Salary from $18,136 to $26,200 commensurate with qualifications. Submit letter of interest including resume and at least three names of references before 1 December 1981 to: Dr. O. L. Inman, Director, Center for Coastal Studies, Scripps Institution of Oceanography, University of California at San Diego, La Jolla, California, 92093. Request position profiles at the same address.

An equal opportunity/affirmative action employer.

Geophysical Sciences. Five faculty positions available in the next two to three years; two anticipated for fall 1982. Applications are invited for two tenure-track positions in geophysics, one in paleynology, one in micropaleontology, and one in sediment geochemistry. Ph.D. required by time of appointment. Successful candidates will be expected to teach graduate and undergraduate courses in area of expertise, develop a research program, and participate in teaching introductory geology.

At least one of these positions may be filled at the Associate Professor rank or above. Salary range is $19,000–$35,000 depending upon experience and field of research. Applications are encouraged from individuals with industrial experience as well as recent graduates. Although all areas of geophysics will be considered, preference will be given to professionals with teaching and research interests in seismic stratigraphy and petroleum exploration.

Candidates for the palynology position should have research interest in Cenozoic-Mesozoic biostratigraphy with preference given to those specializing in nannofossils. Candidates for the sediment geochemistry position should have interests in one or more of the following areas: organic geochemistry/geochemical petroleum explorations, or isotope geochemistry.

OOU is a state-supported University of 15,000 students situated in the metropolitan Hampton Roads area. Send vitae, a brief discussion of research interests, and arrange to have three letters of reference sent by February 15, 1982 to Dr. Randall S. Spencer, Chairman, Department of Geophysical Sciences, Old Dominion University, Norfolk, VA 23508.

An affirmative action/equal opportunity employer.

University of Tennessee, Knoxville/Faculty Positions. The Department of Geological Sciences (Main Campus of the UT System) invites applications for two or three tenure track teaching/research positions effective September 1, 1982.

The appointments will be at the assistant or associate professor level in:

1. Sedimentology or Low-Temperature Geochemistry
2. Metamorphic Petrology or Mineralogy.

The Ph.D. is required. Duties will include pursuit of an active research program as well as teaching and advising at graduate and undergraduate levels. Preference will be given those with documented research capabilities. Applicants will be interviewed at the Cincinnati G.S.A. meeting. Send resume (including transcripts) and names of 3 referees to: Thomas W. Broadhead, Search Committee, Department of Geological Sciences, University of Tennessee, Knoxville, TN 37916. Application deadline, January 15, 1982.

UTK is an EEO/Title IX/Section 504 employer.

Director Geodetic Survey, NOAA. The National Oceanic and Atmospheric Administration (NOAA) announces a Senior Executive Service Vacancy for the position of Director, Geodetic Research and Development Laboratory (GRDL) in the National Geodetic Survey, a component of the National Ocean Survey. The duty location is Rockville, Maryland. The salary range is $47,889–$50,112.50 per annum. Duties include providing technical and administrative supervision over employees and activities of GRDL; advising officials on the state of scientific knowledge in geodesy and making recommendations for research and development; exercising scientific and technical knowledge of contributing publications to professional journals and making presentations at national and international meetings; and advising and consulting scientists and executives in improvement of geodesy and related fields. Experience in management of scientific programs, geodesy, and solid earth sciences is required. Apply to: NOAA/NOS-9001 Executive Boulevard, Rockville, Maryland 20852. Attn: MB/PER15TR

NOAA is an equal opportunity employer.

Staff Scientists/Scientific Programmers. Research & Data Systems, Inc. has openings available for Staff Scientists and Scientific Programmers to work in areas involved in the processing and application of data from satellite based remote sensing systems. Particular needs involve the study of atmospheric dynamics specifically as it relates to the stratosphere/troposphere interface, stratospheric composition and dynamics and dynamic feedback mechanisms. Other needs exist in the areas of orbit/attitude computation, objective analysis and radiative transfer. Successful candidates will have an advanced degree in meteorology, physics, astronomy or mathematics with a strong computer software background particularly on IBM equipment. Send resume in confidence to: Research & Data Systems, Inc., 9420 Annapolis Road, Lanham, Maryland 20706. Telephone: (301) 459-0001.

Faculty Positions: Earth Sciences. SUNY Stony Brook is seeking candidates for tenure track appointments in the Department of Earth & Space Sciences, with emphasis on active research experience and an interest in teaching graduate and undergraduate students. Rank and salary are dependent on experience and qualifications. Areas of specialization are open since we are looking primarily for high-caliber applicants, but preference will be given to applicants with research experience in one or more of the following: Structural Geology, Tectonophysics, Geophysics, Mineralogy, Petrology, Geochemistry, and Mineral Resources. Qualified persons should send resume to Prof. Gilbert N. Hanson, Department of Earth & Space Sciences, SUNY Stony Brook, Stony Brook, NY 11794.

SUNY Stony Brook is an equal opportunity/affirmative action employer. AK#140 6.

University of Maryland/Faculty Position. The University of Maryland invites applications from highly qualified scientists for a tenure track faculty position at the assistant or associate professor level in the Department of Meteorology. Candidates must have a Ph.D. in meteorology, physics, engineering or chemistry and have an area of specialization that will enable them to lead a research program in environmental physics and air pollution. The research activity of the candidate should complement the meteorological research of the Department and continue the strong interaction in the physical sciences across departmental lines. Duties will include teaching senior/graduate courses related to environmental physics and air pollution and developing an active research program. Salary will be commensurate with qualifications and experience. All applicants should send curriculum vitae, a brief statement of research interests and names, addresses and telephone numbers of those professional references to: Professor Ferdinand Baer, Chairman, Department of Meteorology, University of Maryland, College Park, MD 20742. Closing date for applications is 1 December 1981.

The University of Maryland is an equal opportunity/affirmative action employer.

Groundwater Hydrologist. The Minnesota Department of Natural Resources, Division of Waters has a vacancy at the Principal Hydrologist level for an experienced groundwater hydrologist to provide leadership for a program of ground water studies and monitoring to support State Water allocation decisions and to provide quantitative assessments for planning and management purposes. Address inquiries and requests for application forms to: Sarah P. Tufford, ONR-Division of Waters, Third Floor Space Center Building, 444 Lafayette Road, St. Paul, Minnesota, 55101. Present salary range: $23,323 to $31,132 annually, subject to revision in the near future.

Faculty Positions: Environmental Engineering. Beginning January or September 1982. The position requires undergraduate and graduate teaching and sponsored research activities in the areas of water quality control and water resources. An earned doctorate is required and at least one degree in civil engineering is preferred. Rank will be at the assistant professor level and salary will depend upon qualifications. Apply to: Dr. Lester A. Heel, Chairman, Department of Civil Engineering, University of Virginia, Charlottesville, Virginia 22901.

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EARTH SCIENCES

The Lamont-Doherty Geological Observatory of Columbia University invites scientists interested in any field of the earth sciences to apply for the following fellowships: two postdoctoral fellowships, each awarded for a period of one year (extendable to two years in special instances) beginning in September 1982 with a stipend of $22,500 per annum. Completed applications are to be returned by January 15, 1982.

Application forms may be obtained by writing to the Director, Lamont-Doherty Geological Observatory, Palisades, New York 10964. Award announcements will be made February 28, 1982 or shortly thereafter.

The Observatory also welcomes applications from candidates for postdoctoral research associate positions in this discipline.

Visitor Appointments: NCAR. Visitor Appointments at the High Altitude Observatory are available for new and established Ph.D.'s for up to one year periods to carry out research in solar physics, solar-terrestrial physics, and related subjects. Applicants should provide a curriculum vitae including education, work experience, publications, the names of three scientists familiar with their work, and a statement of their research plans. Applications must be received by 15 January 1982, and they should be sent to: Visitor Committee, High Altitude Observatory, National Center for Atmospheric Research (NCAR), P.O. Box 3000, Boulder, Colorado 80307. NCAR is an equal opportunity affirmative action employer.

Petrologist: Northern Illinois University. Applications are invited for a tenure track position in igneous or metamorphic petrology at the assistant or associate professor level beginning either January, 1982 or August, 1982. A Ph.D. degree is required and post-doctoral research experience is preferred. The successful candidate will be expected to pursue an active research program, teach at the undergraduate and graduate level, and direct Masters and Ph.D. graduate research work. Facilities housed within the Department of Geology include a fully automated electron microprobe, SEM, solid-source and gas-source mass spectrometers, AA, XRD, and XRF. To receive full consideration, please send resume, statement of research interests, and the names of three references, by November 1, 1981, to Jonathan H. Berg, Search Committee Chairman, Department of Geology, Northern Illinois University, DeKalb, Illinois, 60115.

An equal opportunity/affirmative action employer

Engineering Geologist/Geophysicist. The Department of Geological Sciences, University of Saskatchewan, has a vacant tenurable position in engineering geology/geophysics. Applicants should be qualified to teach undergraduate and graduate courses and to conduct research in engineering geology. A background in structural geology may be appropriate. Well-equipped facilities are available for research in rock mechanics, fluid flow through porous media, acoustic, and electrical properties of rocks, and permafrost. Good opportunities exist for joint research with qualifications and experience. Send applications, detailed personal resume including the names of at least three referees, and other supporting data to Gr. W.G.E. Caldwell, Head, Department of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0W0.

Please note: until November 15, 1981 consideration will be given only to applicants who are Canadians or landed immigrants, after that date all applications will be considered.

Virginia Polytechnic Institute and State University: Senior Research Associate. Interesting and abundant research and publishing opportunities, including new University-owned MGS-10 VIBROSEIS system, VAX 11-780 computer. Must have experience in theory and application of reflection seismology, and be interested in the application of reflection seismology to the solution of geologic problems.

Send resumes to. Dr. O. R Wones, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0798

The University is an equal opportunity/affirmative action employer

Instrumental Analyst/Staff Research Associate III. Job # 81-08-23. Oversee computer-automated wave-length dispersive XRF spectrometer. Minimum qualifications: two years analytical experience or equivalent academic background, preferably but not necessarily with XRFC or NGVA computer. Duties include: maintenance and repair of equipment; software development in FORTRAN for on-line minicomputer; participation in design and execution of strategies for analyzing trace metals in geological materials, and instruction of users After first year, opportunity exists for personal research as time permits Applicants should list equipment and applications with which they're experienced, and responsibilities therewith Salary $1755/month

Apply to Personnel Office, University of California Santa Cruz, 1156 High Street. Santa Cruz, Ca. 95064 no later than November 1, 1981.

Faculty Positions
Space Physics and Astronomy
Rice University

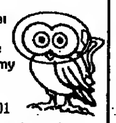
The Department of Space Physics and Astronomy of Rice University has two regular faculty openings, beginning in academic year 1982–83.

For one position, which is at the professorial level, preference will be given to experimentalists who are Principal Investigators for experiments on present or planned spacecraft missions. However, consideration will be given to other qualified candidates in the general areas of space physics and atmospheric science.

For the other position, which is at the assistant professor level, preference will be given to candidates with experience in space astronomy, although applications are solicited from specialists in any area of modern astrophysical research. It is also desirable, though not essential, that the candidate's research interests complement one or more areas of present astronomical research at Rice, such as planetary studies, stellar evolution and nucleosynthesis, gaseous nebulae, imaging and spectroscopy of galaxies, and computer image processing.

Applicants should send resumés and bibliographies to:

Professor A. J. Dessler
Chairman
Department of Space
Physics and Astronomy
Rice University
P.O. Box 1892
Houston, Texas 77001



Rice University is an equal opportunity/affirmative action employer.

Petrologist-Economic Mineralogist/University of Oklahoma. Applications are invited for a tenure-track position, effective September 1, 1982 at the assistant professor level, in petrology and economic mineralogy. The successful applicant is expected to teach graduate courses in his/her specialty, to help teach undergraduate courses in mineralogy-optics-petrography, and to pursue an active research program. Consulting and interacting with mining companies are encouraged.

The University of Oklahoma has made a major commitment to diversity the program in the School of Geology & Geophysics. As a result five tenure-track positions are open for the fall of 1982. Six new faculty were added to the School in the fall of 1981 (bringing the total full-time faculty to 15), and an additional six positions will be available during 1983–1985. A new building that will house the School is in the design stage, and the successful applicant will participate in equipping it.

The Ph.D. degree is required for this position. Preference will be given to petrologists with a strong chemistry background and with a demonstrated interest in the economic geology of metallic and non-metallic mineral deposits. Qualified applicants should arrange to send transcripts of all college and university work, resume, statement of research interests, and three letters of reference to: Dr. Maryellen Cameron, School of Geology and Geophysics, University of Oklahoma, Norman, Oklahoma, 73019. Deadline for applications is December 31, 1981. Faculty members from the School will be interviewing at the November G.S.A. meeting in Cincinnati, Ohio, and at the December A.G.U. meeting in San Francisco, California.

The University of Oklahoma does not discriminate on the basis of race, or sex, and is an equal opportunity employer.

Purdue University. The Department of Geosciences invites applications for a faculty position, starting January or July 1982, in the broad field of mineralogy-petrology-geochemistry. A Ph.D. is required and preference may be given to scientists with an established record of research. The Department has an automated electron microprobe, mass spectrometer and laboratory for stable isotope studies, full range of high temperature and high pressure equipment, including furnaces for controlled fO_2 experiments, as well as X-ray equipment. The successful applicant will be expected to participate in both the undergraduate teaching and graduate studies programs, as well as actively engage in research. Rank and salary are open but will be commensurate with qualifications.

Purdue University is a land grant, state supported institution committed to academic excellence, and is an equal opportunity/equal access employer. For further information please contact Dr. Henry G. A. Mayer, Dept. of Geosciences, Purdue University, West Lafayette, IN 47907 (Tel. 317-494-3271).

Closing date for applications is November 10, 1981.

Seismologist. Applications are invited for a postgraduate research position in seismology at the Scripps Institution of Oceanography. Applicants specializing in all areas of seismology will be considered, although preference will be given to recent graduates interested in seismic wave propagation, particularly as applied to the oceanic environment and digital signal processing. The position has a duration of one year, with the possibility of extension to two years, and an annual stipend of $18,960. Please send resume and three references to either Dr. Thomas H. Jordan or Dr. John Orcutt, A-015, Geological Research Division, Scripps Institution of Oceanography, La Jolla, CA 92093, prior to 1 December 1981.

Scripps Institution of Oceanography, University of California, San Diego is an affirmative action/equal opportunity employer.

Faculty Positions: The University of Iowa. The Department of Physics and Astronomy anticipates one or two openings for tenure-track faculty in August 1982. One or more visiting professorships, at any rank, are also expected to be available. Preference will be given to candidates with research activity in the following experimental and theoretical areas: astronomy, astrophysics, atomic physics, condensed matter physics, elementary particle physics, nuclear physics, plasma physics, and space physics. The positions involve undergraduate and graduate teaching, guidance of research students, and personal research. Interested persons should send a résumé, a statement of research interests, and the names of three professional references to Search Committee, Department of Physics and Astronomy, The University of Iowa, Iowa City, IA 52242.

The University of Iowa is an equal opportunity/affirmative action employer.

Atmospheric Scientist/Oceanographer Position: The Joint Institute for the Study of the Atmosphere and Ocean, University of Washington. Atmospheric scientist/oceanographer needed to undertake analysis of interannual and interdecadal climate-related fluctuations in the ocean and atmosphere as revealed by marine surface observations from ships of opportunity and island stations.

Applicants should show evidence of published work on related topics and be adept at eliciting dynamical properties from the analysis of large data sets.

The position is offered through the Joint Institute for the Study of the Atmosphere and Ocean, a cooperative research institute between the University of Washington and the National Oceanic and Atmospheric Administration. The work will be carried out in conjunction with scientists at the University and at the NOAA Pacific Marine Environmental Laboratory, which is housed on the University campus.

Appointment is for one year, with a possibility of renewal for subsequent years up to a three-year term. Salary is negotiable, depending on qualifications and experience.

To apply or request further information, write to Director, J.I.S.A.O., Department of Atmospheric Sciences, AK-40, University of Washington, Seattle, WA 98195 U.S.A. Applications should include resumé, bibliography, and two letters of recommendation. Closing date November 16, 1981.

An equal opportunity/affirmative action employer.

The Caswell Silver Distinguished Professorship in Geology
THE UNIVERSITY OF NEW MEXICO

The Department of Geology of the University of New Mexico is pleased to invite nominations or applications for the Caswell Silver Distinguished Professorship in Geology. This endowed professorship shall be awarded for periods of up to two years to earth scientists of distinguished accomplishment and international reputation. The professorship may be held by scientists of all specialties of the earth sciences in the broadest sense, and the major criterion for selection is that the individual be an active, productive leader in his or her field of research. The recipient must carry out a vigorous research program while in residence at UNM. The recipient is expected to interact with the faculty and students of the Department and to provide one or more seminars, in an advanced topic of his/her choice, during each academic year. The Foundation will provide unusually advantageous remuneration commensurate with the distinguished nature of the appointment. In addition, a generous allocation for travel and operating expenses (to include secretarial support, analytical services in department laboratories, use of field vehicles, and preparation of manuscripts) will be provided.

Applications or nominations should include a detailed resume and brief statement of major research accomplishments. Applications or nominations should be forwarded to:

Rodney C. Ewing, Chairmen
Department of Geology
University of New Mexico
Albuquerque, New Mexico 87131

The deadline for applications is January 1, 1982.
The Caswell Silver Foundation is an equal opportunity employer.

Geophysical Fluid Dynamicist/Physical Oceanographer. Applications are solicited for a junior faculty position in ocean physics or dynamics to begin in the academic year 1982–83. Areas of interest to the Department include analytical, numerical and laboratory modeling of physical processes and phenomena in the sea.

Yale University is an equal opportunity/affirmative action employer and encourages women and members of minority groups to compete for this position.

Curriculum vitae, publications, and the names of three or more referees should be sent by 31 December 1981 to: Robert G. Gordon, Chairman, Department of Geology and Geophysics, P.O. Box 6666, New Haven, CT 06511.

Quaternary Sedimentation and Tectonics or Geophysics. The Geology Department at Miami University invites applicants for a position in either the field of Quaternary sedimentation (including glacial deposits) and tectonics or the field of geophysics. This position is to be filled at the Assistant Professor level beginning in August, 1982. The successful candidate will teach both undergraduate and graduate courses, must possess the Ph.D. degree and have documented ongoing research to be considered for the tenure track position.

Quaternary Sedimentation and Tectonics. Ideally applicants should have research and teaching interests in: (1) basin development and recent tectonics; (2) Quaternary sediment transport and depositional processes including till deposition; and (3) geomorphology.

Geophysics. Applicants should have research and teaching interests in: (1) relations between crustal structure and basin and continental margin evolution; or (2) general geophysics to include areas from among seismology, geomagnetism, gravity, electrical or heat-flow studies.

Visiting Assistant Professorship in Geology. The Department also invites applicants for a visiting assistant professor position beginning in August 1982. The position is of 1 to 3 year duration and is nontenure track. The successful candidate must have the Ph.D. and will be responsible for teaching introductory-level courses as well as teaching and study in the person's area of research interest. This area is unspecified. The successful applicant will be chosen on the basis of qualifications and ability to interact with researchers currently on the staff.

Applicants should send a resumé, transcripts, three (3) letters of reference and an outline of teaching and research interests to: Dr. A. Dwight Baldwin, Jr., Chair, Geology Department, Miami University, Oxford, Ohio 45056.

An equal opportunity/affirmative action employer.

City University of New York, [Brooklyn College]: Faculty Positions. The Department of Geology anticipates filling several tenure track positions at Full Professor level. (Salary range up to $43,400). Highly qualified individuals will be considered for distinguished appointments at an additional $5,000.

While candidates who have distinguished themselves in any field are welcome to contact us, we are particularly interested in openings in: energy resources (coal/petroleum), exploration geophysics, environmental geology or hydrogeology, coastal sedimentology, economic geology.

Successful applicants will be required to institute an active research program, supervise Master's and Ph.D. theses. Nominations and applications with current vitae should be sent to: Dr. S. Sheila Gharji, Chairman, Dept. of Geology, Brooklyn College of City University of New York, Brooklyn, New York 11210. Positions open until filled.

Brooklyn College, CUNY, is an affirmative action/equal opportunity employer.

Faculty Positions. Arizona State University, Department of Geology. Applications are invited for two tenure-track faculty positions, one at the assistant professor level and one at the associate level, beginning in August of 1982. One of these positions requires a candidate with interests in applying modern solid state science to geological phenomena. The selected candidate should develop an active research program and may use the extensive opportunities offered by the Facility for High Resolution Electron Microscopy at ASU. Teaching duties will include undergraduate mineralogy. Candidates for the other position should complement and extend existing strengths in the department. Possible areas include low temperature geochemistry, heavy isotope geochemistry, solid earth geophysics, tectonophysics, and related fields. The ability to use modern techniques in both field and laboratory studies and to integrate diverse approaches is highly desirable. Please send a detailed statement of research and teaching interests and a resume with names of four references to David Krinsley, Department of Geology, Arizona State University, Tempe, AZ 85287, by January 15, 1982.

Arizona State University is an equal opportunity/affirmative action employer.

Geophysics
University of Colorado

The Department of Physics, University of Colorado at Boulder, and the Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado/NOAA are currently recruiting for a tenure track faculty member, in the Department of Physics, with simultaneous appointment as a Fellow of CIRES, who will complement the Department's active role in the University's interdepartmental Graduate Program in Geophysics. We are particularly (but not exclusively) seeking persons with experience and interest in the areas of space geodesy, geodynamics, or related areas of theoretical geophysics.

Appointment will be at the level of assistant professor (minimum salary: $20,000 per academic year) and is expected to start in the fall of 1982. The appointment entails full participation in the Department's undergraduate and graduate teaching programs (including offerings in the appointee's specialty), supervision of graduate students in appropriate areas, and the development of an active research program.

Candidates should send a letter of interest, a current curriculum vitae, and have three letters of reference sent no later than 1 January 1982 to:

Chairman
Department of Physics
Campus Box 390
University of Colorado
Boulder, Colorado 80309

The University of Colorado is an affirmative action/equal opportunity employer.

SERVICES

URANIUM DEPOSITS. If you are financing, planning, designing, exploring, drilling, or digging in connection with any form of energy, you need this complete, up-to-date book about the world's uranium deposits. Includes production and reserves for mines. Hardcover 8 × 11 inches, 303 pages. Table of contents, drawings, index, references, 1978. $66. Teitsch Associates, 120 Thunder Road, Sudbury, Mass. 01776.

STUDENT OPPORTUNITIES

Graduate Research Assistantships in Physical Oceanography. Opportunities for graduate study with research assistantship available for students interested in M.S. or Ph.D. programs. A summer program with stipend is open to college juniors. Write: Douglas Caldwell, School of Oceanography, Oregon State University, Corvallis, OR 97331

Earth Sciences Assistantships and Fellowships. Research assistantships and fellowships are available to graduate students in the earth sciences from the Columbia University Department of Geological Sciences. The awards cover tuition and fees, and provide a yearly stipend of between $5400 and $8190.

Research is carried out at affiliated institutions including the Lamont-Doherty Geological Observatory, the Goddard Institute for Space Studies, and the American Museum of Natural History. Research topics available to students reflect the interests of the more than 300 Ph.D.-level scientists at these institutions and span virtually every area of the earth sciences.

The department encourages applications from students with an undergraduate degree in any of the natural sciences or engineering. For additional information please contact Ms. Mie Lee, Department of Geological Sciences, Columbia University, Lamont-Doherty Geological Observatory, Palisades, New York, 10964.

Graduate Teaching & Research Assistantships/University of Houston. Graduate teaching & research assistantships available to qualified persons interested in Space Physics at the University of Houston Our experimental program features rocket & balloon-borne studies of the ionosphere & magnetosphere-ionosphere coupling. Emphasis has been on active experiments, most recent being a rocket-balloon campaign at Siple station, Antarctica in December 1980. Future work includes a study of pulsating aurora & participation in Waterhole II, an auroral quenching experiment. The theoretical program is on plasma waves in the solar wind & modeling of phenomena related to current experiments. Assistantships for first year students begin at $600/mo along with out of state tuition waivers. Graduate Chairman, Physics Dept., University of Houston Central Campus, Houston, TX 77004. EOE

COURSES

Course No. 450: Clouds: Their Formation, Properties and Effects, Pasadena, CA, NOV 30-DEC 4, 1981. This course is designed to provide a basic understanding of the concepts and an overview of the dynamical and micro-physical processes involved in the formation of air pollution. The results of recent studies of clouds on other planets will also be discussed. This course is especially structured to benefit those scientists whose main area of expertise is not in clouds but who wish to be brought abreast of current studies in this subject. Instructors will be Ors P. Hobbs, C. Leovy, H. O. Grville, S. Scott, T.Vonder Haar, and E. J. Zipser. Registration fee is $590.

A Certificate of Course Completion will be awarded to those who complete the course. For further information contact Diane McGuestion, Course Coordinator, IFAORS, P.O. Box P, Hampton, Virginia 23666 (Tel: 804/827-5811).

AGU

VGP News

- A new journal, *Volcanology and Seismology*, is now being published by the U.S.S.R. Academy of Sciences. S.A. Fedotov is the editor. AGU was approached as a possible publisher of a selected English translation of the journal, which was to be sold by subscription. There was not enough interest to proceed, and the translation rights are no longer available to AGU. To serve the needs of the section better, please let us know what Soviet journals should be considered for translation. Please notify Joseph V. Smith, Department of Geophysics and Science, University of Chicago, Chicago, IL 60637 (telephone: 312-753-8110). In particular, please state whether your library would buy translations.
- Andrew F. Nagy (Department of Atmosphere and Ocean Sciences, 2455 Hayward, University of Michigan, Ann Arbor, MI 48109 (telephone: 313-783-5536) is soliciting review articles for *Reviews of Geophysics and Space Physics*. VGP members are urged to contact Nagy if they have ideas for suitable papers.
- VGP members who attend the AGU Fall Meeting in San Francisco will want to attend the joint Planetology VGP luncheon on Thursday, December 10, at the Nikko Restaurant. The luncheon in Baltimore was very enjoyable, and this one will feature the added attraction of providing the opportunity to meet informally with members of the section of Planetology.

Brent Dalrymple
Secretary, VGP

Hydrology Prepares to Select Fellows

According to the recent AGU Council ruling, the Hydrology Section's Fellows Nominating Committee soon will select three hydrologists from those nominated by section members for the honor of AGU Fellow. The names of the three selected will be forwarded to the chairmen of the AGU Fellows Committee for their annual selection of approximately 11 Fellows.

The Hydrology Section's committee is composed of Leonard F. Konikow, Ignacio Rodriguez-Iturbe, Mark F. Meier, and Jaime Amorocho. Peter Eagleson, section president-elect, serves as committee chairman; Jim Wallis, president of the Hydrology Section, is an ex-officio committee member.

Travel Grants to IAG General Meeting

Deadline for Applications: January 1, 1982

ACU has applied to the National Science Foundation for a grant to assist the travel of individual U.S. scientists to the General Meeting of the International Association of Geodesy, to be held in Tokyo, Japan, May 7–20, 1982. Application forms for the grants are available from Member Programs Division, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, D.C. 20009 (telephone 202-462-6903 or toll free 800-424-2488).

Nominations for Medals and Awards

William Bowie Medal. Awarded for outstanding contributions to fundamental geophysics and for unselfish cooperation in research.

Maurice Ewing Medal. Honors an individual who has led the way in understanding the physical, geophysical, and geological processes in the ocean; ocean engineering, technology, and instrumentation; or who has given distinguished service to the marine sciences.

James B. Macelwane Awards. Up to three awards are presented each year for significant contributions to the geophysical sciences by a young scientist of outstanding ability. Recipients must be less than 36 years old.

Robert E. Horton Medal. Awarded for outstanding contributions to the geophysical aspects of hydrology.

Letters of nomination outlining significant contributions and curriculum vitae should be sent directly to the appropriate committee chairman: *Bowie Medal*—George D. Garland, Department of Geophysics, University of Toronto, Toronto 5, Ontario, Canada. *Ewing Medal*—Robert O. Reid, Department of Oceanography, Texas A & M University, College Station, TX 77843; *Macelwane Award*—Menik Talwani, Lamont-Doherty Geological Observatory, Palisades, NY 10964; *Horton Medal*—Peter S. Eagleson, Department of Civil Engineering, Building 48-335, Massachusetts Institute of Technology, Cambridge, MA 03139.

DEADLINE FOR NOMINATIONS IS DECEMBER 15, 1981

SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

CONFERENCE ON MATHEMATICAL AND COMPUTATIONAL METHODS IN THE EXPLORATION AND EXTRACTION OF DEEP MINERAL RESOURCES

November 16-19, 1981
Tucson Marriott
Tucson, Arizona

A conference and workshop structured specifically to foster the exchange of ideas and techniques between applied mathematicians, geophysicists and others concerned with the technical problems of exploration and extraction of deep mineral resources.

- Formal presentations on the problems and solution approaches, with the focus on where the methods work . . . and where they don't.
- Workshops on electromagnetic and seismic methodologies, where participants will have the opportunity to discuss their problems and their research.
- Poster presentations that provide the opportunity for participants to discuss specific progress being made by researchers, and contributed papers by other researchers in the fields being addressed.

Here is a conference that provides time for participants to engage in informal discussions about their work. The program committee will encourage the organization of some informal workshops involving speakers and registrants, in addition to those formally scheduled.

Invited speakers:

Peter Annan, Golder Associates
Robert W. Bartlett, Anaconda Copper Company
Norman L Bleistein, Department of Mathematics, University of Denver
Alberto P. Calderon, Department of Mathematics, University of Chicago
Michel David, Mineral Exploration Research Institute
James G. Glimm, Department of Mathematics, Rockefeller University
Phillip Grote, Science Applications, Inc.
Gerald W. Hohmann, Department of Geology and Physics, University of Utah
Jim Kosolas, International Submarine Technology, Ltd.
Kenneth L. Larner, Western Geophysical Co.
Thomas R. LaFehr, Exploration Data Consultants Incorporated
Richard B. McCammon, United States Department of the Interior
K. G. McCracken, Institute of Earth Resources
Misac N. Nabighian, Newmont Exploration Limited
Enders A. Robinson, Department of Geological Sciences, Cornell University
Robert H. Stoll, Conoco, Inc.
Ted Way, In-situ Consulting, Inc.

Advance Registration

To obtain a copy of the program, advance registration material and hotel reservation card, contact SIAM, 117 South 17th Street, Philadelphia, PA 19103. Telephone: (215) 564-2929.

The symposia for this conference is being supported by the National Science Foundation.

Meetings

Remote Sensing Symposium

A call for papers has been issued for the symposium on Remote Sensing and Mineral Exploration, scheduled for May 17–22, 1982, in Ottawa, Ont. The symposium will include a session on the use of geophysical data with remotely sensed imagery in the exploration of petroleum and mineral deposits and groundwater. Emphasis during the session will be on global terrestrial data sets, geophysical satellite systems and data, manual and digital synthesis of spaceborne remotely sensed imagery with geophysical data in geological exploration, and case histories. Session chairman is David A. Hastings at the Applications Branch of the EROS Data Center, Sioux Falls, SD 57198 (telephone: 605/594-6114).

Other sessions on the agenda include spectral measurements of rocks and alteration zones; temporal aspects of mineral resources discovery; continental and global models; North American Plate mosaic and lineament map; and future plans for research and information exchange.

Deadline for submission of abstracts to the symposium chairmen is January 15. For additional information, contact W. D. Carter, Symposium Chairman, EROS Office, U.S. Geological Survey, MS 730, Reston, VA 22092.

The symposium is sponsored by the Committee on Space Research (COSPAR) of the International Committee of Scientific Unions, the International Union of Geological Sciences, the Association of Geoscientists for International Development, and the International Association of the Genesis of Ore Deposits.

Symposium on Urban Groundwater

A half-day symposium on groundwater in the urban environment will be held as part of the American Geophysical Union's Spring Meeting in Philadelphia on May 31 to June 4, 1982. The symposium is cosponsored by the Groundwater Committee and the Urban Hydrology Committee.

In recent years, much attention has been lavished on surface water in the urban environment, but very little has been published on groundwater considerations specific to urban areas or on the effects of urbanization on groundwater quantity and chemistry. The purpose of this symposium is to highlight current work in this area. Papers are now being solicited for inclusion in the symposium. Topics include, but are not restricted to, the following general areas: methods and effects of dewatering; alterations in groundwater chemistry as a result of waste disposal, spills, and leaks; effects of urbanization on natural groundwater recharge and discharge; and flooding of foundations as a result of rising water levels. The symposium will focus on case studies and applications of models.

Abstracts should be prepared according to AGU format and mailed before February 15, to Mary P. Anderson, Dept. of Geology and Geophysics, University of Wisconsin, 1215 W. Dayton St., Madison, WI 53706. In addition, the abstract original must be sent to Meetings, AGU, 2000 Florida Ave., N.W., Washington, D. C. 20009 by the Spring Meeting abstract deadline in early March. Additional information can be obtained by calling Anderson (608-262-2396) or J. W. Delleur (317-494-2172).

New Techniques to Probe Atmosphere

A symposium entitled 'Radio Probing of the High-Latitude Ionosphere and Atmosphere: New Techniques and New Results' will be held at the Geophysical Institute at the University of Alaska in Fairbanks on August 9–13, 1982. The symposium is sponsored by Commission G of the International Union of Radio Science (URSI). Robert D. Hunsucker is the steering committee chairman.

Scientists interested in submitting papers for presentation at the symposium should contact the technical program committee chairman, Ray A. Greenwald, The Johns Hopkins University, Applied Physics Laboratory, Johns Hopkins Road, Laurel, MD 20707. Information on conference registration can be obtained from the conference coordinator, Patricia Brooks, Geophysical Institute, University of Alaska, 903 Koyukuk Avenue North, Fairbanks, AK 99701. The meeting is limited to 100 participants.

Superior Geology

The 28th Annual Meeting of the Institute on Lake Superior Geology will be held in International Falls, Minn., May 5–8, 1982.

The focus of the meeting will be on Archean geology of the Minnesota-Ontario border area.

One-day field trips to Archean areas near International Falls and Fort Frances, Ont., are planned for May 5 and 8; technical sessions are scheduled for May 6 and 7.

For additional information, contact David L. Southwick, Minnesota Geological Survey, 1633 Eustis St., St. Paul, MN 55108 (telephone: 612-373-3372).

AGU
Congressional Science Fellowship

The individual selected will spend a year on the staff of a congressional committee or a House or Senate member, advising on a wide range of scientific issues as they pertain to public policy questions.

Prospective applicants should have a broad background in science, be articulate, literate, flexible, and able to work well with people from diverse professional backgrounds. Prior experience in public policy is not necessary, although such experience and/or a demonstrable interest in applying science to the solution of public problems is desirable.

The fellowship carries with it a stipend of up to $25,000 plus travel allowances.

Interested candidates should submit a letter of intent, a curriculum vitae; and three letters of recommendation to AGU. For further details, write Member Programs Division, Congressional Fellowship Program, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, D.C. 20009.

Deadline: March 31, 1982.

AGU CHAPMAN CONFERENCE
RAINFALL RATES

April 27–29, 1982 Urbana, Illinois

Convenor: D. M. Hershfield

Sessions planned:

Atmospheric physics as related to rainfall processes.
Measurement: mass (tipping bucket), photoelectric, magnetic, and remote methods.
Models: physical, mathematical, and statistical.
Applications: point, area, quasihorizontal path, surface, troposphere, and stratosphere.

Call for papers published in EOS, July 14. Abstract deadline: December 21, 1981.

The complete Geophysical Year last appeared in the August 25 *Eos*.

Boldface type indicates meetings sponsored or cosponsored by AGU.

Changes

1982

August 23–27 Ninth Annual Meeting of the European Geophysical Society, *previous listing of data of meeting was incorrect*. Additionally, it should be noted that this meeting is run in conjunction with the 18th General Assembly of the European Seismological Commission.

New Listings

1982

January 26–29 Fourth Annual Conference on the NASA Geodynamics Program, Greenbelt, Md. (P. T. Taylor, Code 922, NASA/Goddard Space Flight Center, Greenbelt, MD 20771.)

June 20–25 83rd Annual Meeting of the American Association for the Advancement of Science, Pacific Division, Santa Barbara, Calif. Sponsors, American Meteorological Society, Atmospheric and Hydrospheric Sciences Section of AAAS, Pacific Division. (A. E. Leviton, Executive Director, AAAS (Pacific Division), California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118.)

August 28–31 Alfred-Wegener-Conference on Geophysical, Geochemical and Petrological Evidence on Deformation and Composition of the Continental Subcrustal Lithosphere, Seeheim, Federal Republic of Germany. (K. Fuchs, Geophysical Institute University, Hertzstr. 16, D-7500 Karlsruhe, Federal Republic of Germany.)

GAP

Exploration Geophysics

0910 Computer applications
A BORN-WKBJ INVERSION METHOD FOR ACOUSTIC REFLECTION DATA
See 0910 Seismic methods
Robert W. Clayton (Geophysics Dept. of Geophysics, Stanford University, Stanford; presently Div. of Geological and Planetary Sci., Calif. Inst. of Tech., Pasadena, CA 91125) Robert H. Stolt
Density and bulk modulus variations in an acoustic earth are separately recoverable from standard collection surveys by utilizing the amplitude-versus-offset information present in the observed wave fields. Both earth structure and a variable background velocity can be accounted for by combining the Born and WKBJ approximations, in a "Kelvin stack" migration with two output sections, one for density variations and the other for bulk modulus variations.
For the inversion, the medium is considered to be composed of a known low-spatial frequency variation (the background) plus an unknown high-spatial frequency variation in bulk modulus and density (the reflectivity). The division between the background and the reflectivity depends upon the frequency content of the source.
For constant background parameters, computations are done in the Fourier domain, where the first part of the algorithm includes a frequency shift identical to that in an F-K migration. The modulus and density variations are then determined in obtaining in a least-squares sense amplitude versus offset variations.
For a spatially variable background, WKBJ Green's operators that model the direct wave in a medium with a smoothly varying background are used. A downward continuation with these operators removes the effects of variable velocity from the problem, and consequently, the remainder of the inversion essentially proceeds as if the background were constant. If the background is strictly depth dependent, the inversion can be expressed in closed form.
The method neglects multiples and surface waves and it is restricted to precritical reflections. Density is distinguishable from bulk modulus only if a sufficient range of precritical incident angles is present in the data.
GEOPHYSICS, VOL. 46, NO. 11

0910 Magnetic and electrical methods
WAVELET ESTIMATION AND DECONVOLUTION
O. W. Oldenburg (Department of Geophysics and Astronomy, University of British Columbia, Vancouver, B.C., Canada V6T 1W5)
Three methods have been presented for constructing a smooth wavelet from either a (possibly poor) estimate of the reflectivity sequence or an approximate inverse filter for the source wavelet. An approximate reflectivity sequence might be derived from a velocity log or, or more, the site where the normal incidence seismogram was recorded, or it might be equated to the sequence obtained from minimum entropy deconvolution (MED). The approximate inverse filter for the source wavelet is provided by MED. All methods performed well when tested on data generated from wavelets of different character, and this provides optimism that these methods will work satisfactorily in a variety of geophysical problems where the data are the convolution of a smooth wavelet and a "spiky" model.
The deconvolution problem discussed here is nonunique, and satisfactory wavelet constructions require that some subjectivity be introduced by the investigator. Even so, we present one example where the computed wavelet and reflectivity sequences, both of which appear geophysically reasonable, differed significantly from the "true" functions. This example illustrates the nonuniqueness inherent in this problem and shows the importance of additional constraints on the deconvolution results.
GEOPHYSICS, VOL. 46, NO. 11

0920 Magnetic and electrical methods
ELECTROMAGNETIC ACTIVE SOURCE SOUNDING NEAR THE EAST PACIFIC RISE
Peter B. Young and Charles S. Cox (Scripps Institution of Oceanography, University of California at San Diego, La Jolla, California 92093)
An active source electrical conductivity sounding was carried out near the East Pacific Rise at 21°N. The average electrical conductivity from 2 km beneath the seafloor into the upper mantle was found to be about [illegible] S/m. There is no evidence of fully molten magma at a distance of 7 km from the spreading axis. The inferred conductivity with depth of the crustal rock is consistent with Brace's model of connected seawater filled pores in rocks heated from beneath. (Electromagnetic active sources, data inversion, East Pacific Rise)
Geophys. Res. Lett., Paper 1L1160

0910 Magnetic and electrical methods
VERY LOW-FREQUENCY ELECTROMAGNETIC INTERPRETATION USING TILT ANGLE AND ELLIPTICITY MEASUREMENTS
A. Saeli Saydam (Shell Canada Resources Ltd., P.O. Box 100, Station M, Calgary, Alta., Canada T2P 2H5)
During this study, a plane-wave computer modeling approach was used to gain some insight into the response of vertical sheet conductors at very low frequency (VLF). The medium which surrounds the conductors is assumed to be a dissipative one. Magnitude and shape of the anomalous field caused by a vertical "thin" conductor at VLF is found to be dependent mainly on (1) conductivity-thickness product of conductor, (2) resistivity of host medium, (3) depth to the top of conductor, and (4) overlying conductive overburden. Other variables being the same, a shift in frequency in the 17 to 25 kHz range does not produce an appreciable change in the overall response of modeled conductors. The lateral distance between the maximum and minimum on a tilt angle profile is related to conductivity and thickness of conductor, resistivity of the host rock, and depth to the top of the conductor in a complex manner.
An interpretation scheme has been proposed to determine the conductivity-thickness product and depth of vertical sheet conductors from tilt angle and ellipticity measurements at VLF. Resistivity of the host medium had to be incorporated in the scheme due to strong dependence of response on this parameter. Five characteristic diagrams have been constructed corresponding to host rock resistivities of 30, 250, 800, 2100, and 8000 Ω-m, which cover the most commonly encountered resistivities in the field. Conductivity-thickness product and depth (D) of conductor can be read directly from the appropriate diagram when peak-to-peak tilt angle and ellipticity values are entered.
GEOPHYSICS, VOL. 46, NO. 11

0910 Magnetic and electrical methods
MAGNETITE MAPPING WITH A MULTICOIL AIRBORNE ELECTROMAGNETIC SYSTEM
Douglas C. Fraser (Dighem Limited, S.O. Box 178, 1 Sirus Canadian Place, Ste. 1010, Toronto, Ont., Canada M5T 1C1)
The information content of data from an in-phase quadrature electromagnetic (EM) system consists of a combination of conductive eddy current response and magnetic polarization response. The secondary field resulting from conductive eddy current flow is frequency-dependent and consists of both in-phase and quadrature components of positive sign. Conversely, the field resulting from magnetic polarization is commonly frequency-independent and consists of only an in-phase component of negative sign.
A magnetite mapping technique was developed for the horizontal coplanar coils of a closely coupled multicoil airborne EM system. The technique yields contours of apparent weight percent magnetite when using a homogeneous half-space model. The method can be complementary to magnetometer mapping in certain cases. Compared to magnetometry, it is less sensitive but is more able to resolve closely spaced magnetite zones. The method is also independent of remanent magnetism and magnetic latitude. It is sensitive to .25 percent magnetite by weight when the sensor is at a height of 30 m above a magnetitic half-space. It can individually resolve steeply dipping narrow magnetite-rich bands which are separated by 60 m.
GEOPHYSICS, VOL. 46, NO. 11

0910 Magnetic and electrical methods
INTERPRETATION OF MAGNETIC ANOMALIES DUE TO DIKES: THE COMPLEX GRADIENT METHOD
O. Atchuta Rao (National Geophysical Research Institute, Uppal Road, Hyderabad 500 007, India) B.V. Ram Babu, and Y.V. Sankar Narayan
A method to interpret the magnetic anomaly due to a dipping dike using the resultant of the horizontal and vertical gradients of the anomaly is suggested. The resultant of both the gradients is a vector quantity and is defined as the "complex gradient." A few characteristic points defined on the amplitude and phase plots of the complex gradient are used to solve for the parameters of the dike. For a dike uniformly magnetized in the earth's magnetic field, the amplitude plot is independent of θ_m, the index parameter, which depends upon the strike and dip of the dike and the magnetic inclination of the area. The phase of the complex gradient is an antisymmetric curve with an offset value equal to $-\theta_m$. For a dike whose half-width is greater than its depth of burial, two maxima at equal distances on either side of a minimum value appear on the amplitude plot. For a dike whose half-width is equal to or less than its depth of burial, the amplitude plot is a bell-shaped symmetric curve with its maximum appearing directly over the origin. In the case of a thin dike, the amplitude function falls off to half its maximum value at the same point on the abscissa where the phase function reaches, i.e., $-(\theta_m \pm \pi/2)$. A combined analysis of the amplitude and phase plots of the complex gradient yields all the parameters of the dike. The method is applicable for the magnetic anomaly in either the total, vertical, or horizontal field. A field example is included to show the applicability of the method.
GEOPHYSICS, VOL. 46, NO. 11

0530 Seismic methods
AN INTRODUCTION TO THE GENERALIZED RECIPROCAL METHOD OF SEISMIC REFRACTION INTERPRETATION
Derecke Palmer (Geological Survey of New South Wales, GPO Box 5288, Sydney, N.S.W. 2001, Australia)
The generalized reciprocal method (GRM) is a technique for delineating undulating refractors at any depth from in-line seismic refraction data consisting of forward and reverse traveltimes.
The traveltimes at two geophones, separated by a variable distance XY, are used in refractor velocity analysis and time-depth calculations. At the optimum XY spacing, the upward traveling segments of the rays to each geophone emerge from near the same point on the refractor. This results in the refractor velocity analysis being the simplest and the time-depths showing the most detail. In contrast, the conventional reciprocal method which has XY equal to zero is especially prone to produce numerous fictitious refractor velocity changes, as well as producing gross smoothing of irregular refractor topography.
The depth conversion factor is relatively insensitive to dip angles up to about 20 degrees, because both forward and reverse data are used. As a result, depth calculations to an undulating refractor are particularly convenient even when the overlying strata have velocity gradients.
The GRM provides a means of recognizing and accommodating undetected layers, provided an optimum XY value can be recovered from the traveltime data, the refractor velocity analysis, and/or the time-depths. The presence of undetected layers can be inferred when the observed optimum XY value differs from the XY value calculated from the computed depth section. The undetected layers can be accommodated by using an average velocity based on the optimum XY value. This average velocity permits accurate depth calculations with commonly encountered velocity contrasts.
GEOPHYSICS, VOL. 46, NO. 11

0910 Seismic methods
MEASUREMENTS OF ATTENUATION FROM VERTICAL SEISMIC PROFILES
Fred S. Hauge (Formerly Exxon Production Research Co., P.O. Box 2189, Houston, TX 77001; presently Phillips Petroleum Co., 71-C PRC, Bartlesville, OK 74004)
Values of attenuation have been extracted from five detailed velocity surveys. Significant amounts of attenuation are observed in all five wells. Measured values of attenuation vary by a factor of 10, ranging from less than 0.1 to 0.9 dB/wavelength. Correlation of attenuation with lithology is good, considering the resolution limits of the surveys. One of the surveys was performed in West Texas, and the other four were carried out in the Gulf Coast area. The total number of recording depths in each survey varied from 31 to 208, with downhole recordings taken every 10 to 20 ft over key stratigraphic zones. In all five surveys, a monitor geophone was placed near the well to check for source consistency.
Our procedure for measuring attenuation involved constructing the spectral ratio between each downhole pulse and one particular reference pulse. A value of cumulative attenuation (CA) was then extracted from each spectral ratio and plotted as a function of geophone depth. This method allowed me to get many measurements in determining the attenuation over each depth interval.
GEOPHYSICS, VOL. 46, NO. 11

0930 Seismic methods
SEISMIC AMPLITUDE ANOMALIES ASSOCIATED WITH THICK FIRST LEO SANDSTONE LENSES, EASTERN POWDER RIVER BASIN, WYOMING
A. R. Balch (U.S. Geological Survey, Box 25046, MS 960, Denver Federal Center, Denver, CO 80225) M. W. Lee, John J. Miller, and Robert T. Ryder
Several new discoveries of oil production in the Leo sandstone, and economic wells in the Pennsylvanian middle member of the Minnelusa Formation, eastern Powder River basin, Wyoming-Nebraska-South Dakota, have renewed exploration interest in this area. Vertical seismic profiles (VSP) and model studies suggested that a measurable seismic amplitude anomaly is frequently associated with the thick First Leo sandstone lenses. To test this concept, a surface reflection seismic profile was run between two wells about 12 miles apart. The First Leo was present and productive in one well and thin and barren in the other. The surface profile over the predicted amplitude anomaly at the well where a thick lens is known to exist. Two other First Leo amplitude anomalies also appear on the surface seismic profile between the two wells, which may indicate the presence of additional lenses.
GEOPHYSICS, VOL. 46, NO. 11

0930 Seismic methods
RANDOM UNCERTAINTY OF INTERVAL VELOCITY ESTIMATES
S. Sajal (Department of Geological Sciences, University of Saskatchewan, Saskatoon, Sask., Canada S7N 0W0) I. T. Sarada
The Dix equation (Dix, 1955) is commonly used to estimate interval velocities from stacking velocity and traveltime information. The errors in these estimates are result from a number of factors, including indiscriminate substitution of stacking velocities for root-mean-square (RMS) velocities without compensating for the effects of spread-length or dipping velocities.
A first-order error equation has been developed which estimates the maximum uncertainty for Dix-derived interval velocities when the accuracy of the input rms velocity and normal incidence time information is considered. Some simple numerical experiments using this equation indicate that the uncertainty in the calculated interval velocity increases with depth and is inversely proportional to layer thickness, even when the errors in the input velocity and time variables remain constant.
GEOPHYSICS, VOL. 46, NO. 11

Meteorology

7111 Meteorology (Stratospheric Trace Gases)
ATMOSPHERIC TRACE GAS MEASUREMENTS WITH A NEW CLEAN AIR SAMPLING SYSTEM
E. Leifer (Environmental Measurements Laboratory, U.S. Department of Energy, New York, NY 10014), R. Sommers and S. F. Guggenheim
The development of a new clean air sampling system for the Department of Energy's WB-57F aircraft has allowed the analysis of CCl_3F (fluorocarbon-11), CCl_2F_2 (fluorocarbon-12), $CClF_3$ (fluorocarbon-13), $C_2Cl_3F_3$ (fluorocarbon-113), CH_4, CO, CO_2, N_2O, CH_3Cl, CCl_4, CH_3CCl_3, OCS and SF_6 in tropospheric and stratospheric samples. Samples collected during the interception of the plume from the eruption of Mount St. Helens indicate that OCS was injected into the stratosphere during the eruption. A large CO_2 gradient was found at 19.2 km on this flight. (Trace gases, stratospheric measurements, aircraft sampling).
Geophys. Res. Lett., Paper 1L1318

7115 Electrical phenomena
THE INFLUENCE OF CORONA SPACE CHARGE ON A DIRECT MEASUREMENT OF ATMOSPHERIC POTENTIAL
J. C. Willett (Naval Research Laboratory, Washington, DC 20375)
The error introduced into a tethered-balloon measurement of the atmospheric potential by the plume of space charge drifting downwind from the conducting tether is analyzed. A number of simplifying assumptions yield a mathematically tractable model capable of placing an upper bound on the relative magnitude of this error in terms of the height achieved by the balloon. Relaxing the most severe of these assumptions allows more realistic error estimates at the expense of some loss of rigor. It is concluded that an altitude of between one and two conductivity scale heights is sufficient to reduce the error below 10%. (Atmospheric electricity, ionospheric potential, corona discharge)
J. Geophys. Res., Green, Paper 1C1412

7115 Electrical phenomena
DIRECT MEASUREMENTS OF THE ATMOSPHERIC ELECTRICAL POTENTIAL USING TETHERED BALLOONS
J. C. Willett (Naval Research Laboratory, Washington, DC 20375) and W. David Rust
The progress toward a direct measurement of ionospheric potential is summarized. The measurement technique is described and the results and their implications are discussed. The maximum altitude and potential attained to date are 5.3 km MSL and 155 kV, operating from a 3.7 km MSL mountain ridge. (Ionospheric potential, atmospheric electrical potential, tethered balloons).
J. Geophys. Res., Green, Paper 1C1413

7190 H_2O in the atmosphere
GROUND-BASED MICROWAVE OBSERVATIONS OF MESOSPHERIC H_2O IN JANUARY, APRIL, JULY, AND SEPTEMBER 1980
R. L. Thacker (E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, D. C. 20375), C. A. Gibbins, C. K. Schwartz, and T. B. Bevilacqua
The $6_{1,6}$–$5_{2,3}$ rotational transition at 22.2 GHz has been used to measure the H_2O vertical profile in the upper stratosphere and mesosphere. Observations were made during January, April, July, September 1980 and, except in April, the average profile was characterized by a 10 ppmv layer between 60 and 70 km and a decrease in concentration to less than 1 ppmv above 80 km. (Mesosphere, water vapor, remote sensing)
Geophys. Res. Lett., Paper 1L1471

1755 Interaction of atmosphere with electromagnetic waves
OBSERVATION OF THE LATERAL FLUCTUATION OF THE LASER BEAM PASSING THROUGH THE ATMOSPHERE
T. Yokoi (Yonago Technical College, Yonago, Tottori Prefecture, 683 Japan)
Lateral fluctuation of the laser-beam spot formed after passing through a distance of 1.26 km above the sea-surface was observed together with the air and the surface-water temperatures and the relative humidity. Our main phenomenological findings were as follows. 1) A maximum value of the vertical displacement of the beam spot and that of its sine rate were 1.1 m and 0.5 m/min respectively. 2) The "large fluctuation", the displacement larger than 10 cm, was likely to occur just before the sunrise and more remarkably just after the sunset. 3) In each run of observation the frequency of such a "large fluctuation" seemed to be correlated with the changes in the air temperature and relative humidity. 4) An increment of the temperature gradient corresponding to the maximum displacement of 1.1 m was estimated to be 0.42 deg/m. (Temperature gradient, laser beam, propagation, lateral fluctuation).
J. Geophys. Res., Green, Paper 1C1415

3170 Particles and aerosols
CHARACTERIZATION OF TROPOSPHERIC DESERT AEROSOLS AT SOLAR WAVELENGTHS BY MULTISPECTRAL RADIOMETRY FROM LANDSAT
J. Otterman (Tel Aviv University, Ramat Aviv, Israel) R.S. Fraser and O.P. Bahethi
Characteristics of tropospheric aerosols are derived by comparing measurements from Landsat over heavy concentrations of desert aerosols with data computed from the radiative transfer models. Over the ocean the spectral reflectivities are computed. Over land, the comparison is in terms of the ratios of the nadir reflectivity of the surface – atmosphere system to the reflectivity of the underlying terrain. This remote sensing method is found to be a sensitive approach for measuring the imaginary part of the refractive index, n_i. The desert aerosols under study, in the Iran and Pakistan areas, are essentially pure scatterers: n_i of 0.001 ± 0.001 is reported for each of the four Landsat spectral bands, that is for the spectral interval from 0.5 to 1.1 μm. Aerosol size distribution and optical thickness are assessed with a low accuracy.
J. Geophys. Res., Green, Paper 1C1410

3710 Particles and aerosols
SIZE DISTRIBUTION OF ^{210}Pb AEROSOLS OVER OCEANS
A. Sanak (Centre des Faibles Radioactivités, Laboratoire mixte CNRS-CEA, Avenue de la Terrasse, 91190 – Gif-sur-Yvette, France), A. Gaudry and G. Lambert
We have studied the size distribution of ^{210}Pb aerosols collected by a cascade impactor during a cruise from Marseille (France) to Amsterdam Island (South Indian Ocean). It was shown that 70 to 90% of the activity is measured in particles with a diameter smaller than 1.2 μm either in a continental atmosphere or in open ocean. This result confirms that ^{210}Pb is a good tracer for aerosols produced by gas-to-particle conversion.
Geophys. Res. Lett., Paper 1L1121

Mineralogy, Petrology, and Crystal Chemistry

4210 Crystal chemistry
COPPER COORDINATION IN LOW CHALCOCITE AND DJURLEITE AND OTHER COPPER-RICH SULFIDES
Howard T. Evans, Jr., U.S. Geological Survey, 959 National Center, Reston, VA 22092
The new structure determinations of low chalcocite Cu_2S, and djurleite $Cu_{1.94}S$, have provided a large number of observations of the coordination behavior of copper with sulfur in copper-rich sulfides. Ranges of Cu–S bond lengths are 2.19 to 2.24 Å in linear CuS_2 groups; 2.21 to 2.60 Å in triangular CuS_3 groups; 2.21 to 2.80 Å in tetrahedral CuS_4 groups. Cu–Cu distances range from 1.45 Å upward, the most common around 2.77 Å. These observations are compared with structural data from other copper-rich sulfides, in which the tetrahedral, triangular and linear Cu–S bond configurations frequently show large distortions and wide variations in bond lengths.
Am. Mineral., 66, 7-8

4110 Crystal Chemistry
HETEROGENEOUS MICROSTRUCTURES IN OOLITIC CARBONATES
O.S. Dunderson (Department of Geology and Geophysics, University of California, Berkeley) and H.-R. Wenk
Several bioclastic and oolitic carbonates have been studied with the transmission electron microscope. Aragonite has been distinguished from calcite on the basis of the SAD patterns and the morphology. The aragonite occurred either as microscopic crystals varying in length from 0.1 to 1 mm, or as larger masses twinned on {110}. The study of the calcite in the Jurassic Twin Creek Dolive (Wisconsin) and other limestones with the TEM has revealed the presence of a modulated microstructure in low Mg calcite. Both coarse and fine modulations are found to be parallel to {10$\bar{1}$4} = c. The microstructure is similar in appearance and orientation to a structure found by Reeder (1980) in ancient calcian dolomites. No apparent chemical difference was found when comparing calcite crystals that have the microstructures to those that lack it. The modulated microstructures was found to be related by a twins formed during deformation and is therefore older. It is suggested that the modulated structure is the result of an ordering phase transformation from a calcium carbonate in which the CO_3^{2-} groups are disordered, resulting in the formation of planar faults. Alternatively, defects and partial disorder developed during crystal growth. Disorder appears to occur in secondary calcite crystals, i.e., those which formed by dissolution and reprecipitation from another carbonate.
Am. Mineral., 66, 7-8

4210 Crystal chemistry
THE CRYSTAL STRUCTURE OF JAGOITE
M. Mellini (Ist. Mineralogia, via S.Maria 53 Pisa, Italy) and S. Merlino
The crystal structure of jagoite (a = 8.528, c = 23.32 Å) was solved and refined in space group $P\bar{3}2c$ to R = 0.057.
The structure is characterized by the presence of double and single tetrahedral layers connected by a sheaf of iron and lead cations.
The idealized crystal chemical formula is
$VI_{8}Pb^{2+}_{12}VI_{N_4}(Si_4T_6)(Pb^{2+}_4Si_{11}T_4O_{78}(OH)_4Cl_6$
Possible ordering schemes, in space group P31c, are proposed.
Am. Mineral, 66, July-August

4250 Mineral occurrences and deposits
KARLITE, A NEW BORATE MINERAL
G. Franz (Institut f. Angewandte Geophysik etc., Technische Universität, Straße des 17. Juni 135, D 1000 Berlin, West-Germany) D. Ackermand and E. Koch
Karlite, a new borate mineral with the idealized formula $Mg_7(BO_3)_3(OH, Cl)_5$ occurs in a clinohumite-chlorite marble associated with ludwigite of Schlegeistal, Zillertaler Alpen, Austria. The mineral is white to light green and has a silky luster. It occurs as aggregates of minute needles and prisms elongated to c, as much as 10 mm long, which sometimes have rosette-like forms. Karlite is biaxial negative with a moderate 2V of 24°, α = 1.589, β = 1.632, γ = 1.636, γ − α = .045, X = c, Y = b, Z = a; and is colorless in thin section. The (001) cleavage is perfect. The two most common forms are {110} and {100}. Hardness is 5.5. Streak is colorless. Karlite is orthorhombic, $P2_12_12_1$, with a = 17.929(5), b = 17.600(5), c = 3.102(1) Å, Z = 4, D_{calc} = 3.02, D_{meas} = 2.80 to 2.81. IR spectra indicate that water is present as (OH) only. DTA shows only one strong nonreversible endotherm at 830°C. Melting occurs at 1345°C. Combined microprobe, thermogravimetric and wet chemical analysis yielded SiO_2 0.02, TiO_2 < 0.01, B_2O_3 22.54, Al_2O_3 2.96, Cr_2O_3 < 0.01, FeO 2.27, MnO 0.17, MgO 58.90, CaO 0.14, K_2O 0.01, Na_2O 0.01, F 0.16, Cl 1.26, H_2O^+ 10.40, H_2O^- 0.83 (not included in total), total 101.21, O = F 0.81, corr. total 100.40. The mineral is named in honor of Prof. Dr. Franz Karl, late professor of mineralogy and petrography of the Christian-Albrechts-University, Kiel, West Germany, in recognition of his geologic studies of the Eastern Alps. (Karlite, new mineral, physical properties, structure, IR-spectrum, DTA)
Am. Mineral., 66, 7-8

4260 Petrogenesis, petrography and petrogenetic
KYANITE, ANDALUSITE, SILLIMANITE AND RELATED MINERAL ASSEMBLAGES IN THE TRUCHAS PEAKS REGION, NEW MEXICO
Jeffrey A. Grambling (Department of Geology, University of New Mexico, Albuquerque, NM 87131)
The Truchas Peaks region of northern New Mexico includes an apparent equilibrium occurrence of the Al_2SiO_5 triple point. Andalusite occurs in rocks in the southern end of the Truchas Peaks uplift. Kyanite is present along the eastern edge and sillimanite in the northern part. Kyanite, andalusite and sillimanite coexist in the central part of the area. Near the triple point zone, isograds are controlled by topography: kyanite occurs along ridges, kyanite-andalusite on hillsides and kyanite-andalusite-sillimanite in valleys. The distribution of minerals fits a model of near-horizontal isotherms and isobars, with pressures and temperatures increasing with depth and geothermal gradients increasing from north to south.
Where three aluminum silicates coexist, quartzite contains the assemblage chloritoid-staurolite-kyanite-andalusite-sillimanite-magnetite-hematite-quartz. Experimental data on the phase boundary Fe chloritoid+Al silicate=Fe staurolite+quartz at the hematite-magnetite (fO_2) buffer, corrected for minor elements, indicate temperatures near 535°C. Garnet-biotite geothermometry gives a similar temperature. Sillimanite schist contains cordierite-biotite-chlorite-kyanite-muscovite-quartz in the same area, and graphic and algebraic analysis suggests that this schist crystallized with $X(H_2O)$ less than 1. Comparisons with experimental data, taking into account mineral compositions and estimated $X(H_2O)$, yields V ~ 540°C, $P(total)$ ~ 4 kbar. Calculated P-T conditions are consistent with the position of the triple point according to Holdaway (1971).
Am. Mineral., 66, 7-8

4270 Properties of minerals
THE DISSOLUTION KINETICS OF BRUCITE, ANTIGORITE, TALC, AND PHLOGOPITE AT ROOM TEMPERATURE AND PRESSURE
F. C. Lin and C. V. Clemency (Department of Geological Sciences, State University of New York at Buffalo, Amherst, NY 14226)
Dissolution experiments were done on a series of layer-type Mg minerals (brucite, antigorite, talc, and phlogopite) of progressively more complex structure and chemical composition. Twenty-five gram portions of these minerals were dry-ground to 4400 mesh and then subjected to controlled dissolution in distilled water at 25°C and 1 atm CO_2 partial pressure. For antigorite, talc, phlogopite, Mg from the octahedral sheets was released more rapidly than was Si from the tetrahedral sheets, i.e., the dissolution was incongruent. It appears that the solubility of these layer-type minerals is related to the relative number of octahedral to tetrahedral sheets present in the structure, i.e., the dissolution kinetics of layer-type silicate minerals is controlled by the rate of destruction of the tetrahedral silica sheets of the minerals. (Dissolution, kinetics, phyllosilicate minerals).
Am. Mineral., 66, 7-8

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